

PENNSYLVANIA RAILROAD, AMTRAK BRIDGE NO. 7.96
(Pennsylvania Railroad, Sawtooth Bridge No. 7.96)

HAER NJ-161
HAER NJ-161

Carrying two Northeast Corridor tracks over the Port Authority Trans-Hudson Corporation (PATH) Newark-World Trade Center (WTC) rail track and one Consolidated Rail Corporation (Conrail) freight rail track
Kearny
Hudson County
New Jersey

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Interior Region 1, North Atlantic - Appalachian
U.S. Department of the Interior
1234 Market Street, 20th Floor
Philadelphia, PA 19107

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PENNSYLVANIA RAILROAD, AMTRAK BRIDGE No. 7.96 (Pennsylvania Railroad, Sawtooth Bridge No. 7.96)

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Location: The “Sawtooth Bridges,” (Amtrak Bridge No. 7.80 and Amtrak Bridge No. 7.96) are located along an approximately 1.1-mile-long segment of the Northeast Corridor (NEC), north of the Passaic River between Amtrak milepost (MP) 8.3 (Hudson Interlocking) and MP 7.2 (Swift Interlocking) in the Town of Kearny, Hudson County, New Jersey. They are considered contributing elements within the Pennsylvania Railroad New York to Philadelphia Historic District (Northeast Corridor), which has been determined eligible for the New Jersey and National Registers of Historic Places (NJ/NR).

Amtrak Bridge No. 7.96 carries two NEC tracks over one Port Authority Trans-Hudson Corporation (PATH) Newark–World Trade Center (WTC) rail track and one Consolidated Rail Corporation (Conrail) freight rail track.

Present Owner: The National Railroad Passenger Corporation (Amtrak) is the owner and operator of the Sawtooth Bridges.

Present Use: Amtrak Bridge No. 7.96 is currently in use as a railroad bridge that carries Amtrak’s NEC over PATH’s Newark-WTC rail track a Conrail freight rail track.

Significance: (See information provided in Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160.)

Historian: This documentation was prepared by Molly McDonald, MA, AKRF, Inc. in April 2024.

Project Information: (See information provided in Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160).

Part I. Historical Information

A. Physical History:

1. Date of Construction: Ca. 1907

2. Architect/ Engineer: Based on original plans and elevations for the Sawtooth Bridges on file in Amtrak's archives, the design of the bridges was the product of the Pennsylvania Railroad's engineering office. The plans are signed by A. Shand, Chief Engineer for the Meadows Division and H. R. Leonard, Chief Engineer of Buildings and Bridges. (For more information, see Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160.)¹

3. Builder/ Contractor/ Supplier: A detailed set of structural steel shop drawings for both Sawtooth Bridges are on file in Amtrak's Engineering Archive. These 1907 plans indicate that McClintic-Marshall Construction Co. of Pottstown, PA, provided the structural steel components of the bridges).² According to a contemporary newspaper account, McMullen & McDermott constructed all bridge abutments associated with the New York Tunnel Extension project, and the B.M. & J.F. Shanley firm, of Newark, constructed all site work "west of Secaucus except the bridge abutments."³ Historic directories indicate that Arthur McMullen and Charles H. McDermott's contracting company was based in Washington, DC.⁴

4. Original plans and construction: Plans for Amtrak Bridges 7.80 and 7.96 on file in Amtrak's Engineering Archives in Philadelphia, PA, include several initial plans for the bridges dated to

¹ Molly McDonald, "Pennsylvania Railroad, Amtrak Bridge No. 7.80," HAER No. NJ-160, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior, April 2024, 3.

² McClintic-Marshall Construction Co. *Bridge for Penna. New Jersey & New York R.R. over D.L. & W. R.R. Tracks, East of Harrison, NJ*, February 15, 1907. On file in Amtrak's Engineering Archives, Philadelphia, PA; McClintic-Marshall Construction Co. *Bridge for Penna. New Jersey & New York R.R. over New York Div. (P.R.R. Tracks, East of Harrison, NJ*, February 12, 1907. On file in Amtrak's Engineering Archives, Philadelphia, PA.

³ "Progress of the P.R.R. Tunnel," *The Jersey City News*, June 2, 1906: 1.

⁴ Boyd's Directory of the District of Columbia for 1908. R.L. Polk & Co., Washington, DC, 1908, 75.

1905;⁵ original final contract drawings dated to December of 1906;⁶ a detailed set of structural steel shop drawings of 1907,⁷ and as-built drawings dated to 1908.⁸ (For more information, see Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160.⁹)

5. Alterations and additions: The Sawtooth Bridges underwent to two principal repair campaigns since their ca. 1907 construction: in 1947 and 1981, respectively. Based on contract drawings dated January 31, 1947, the repairs at that time included reinforcement of several floor beam bottom flanges and through-girders with welded plates; replacement of rivet heads either with new rivets or rebuilt by welding; and painting all exposed steel.¹⁰

Based on a second set of contract drawings, additional repairs to the superstructure and abutments were carried out in 1981. The 1981 rehabilitation plans for the bridge called for the removal of concrete encasement from the columns, the strengthening of seven columns, the replacement of the deck waterproofing system, and a full-height concrete repair of the south end of the west abutment under the girder bearing. However, based on field observations, it is possible that the deck waterproofing was not performed. An inspection of the bridge conducted in August 1997 identified a crack in the bottom flange and web of the girder pairing between columns 19C and 20C as a major concern and recommended a repair consisting of bolted splice plates for the bottom flange and web of the girder.¹¹

⁵ Pennsylvania Railroad, *P.N.J. & N.Y.R.R. Location Plan and Revised Location Plans for Bridge over P.R.R. Morris & Essex Div. of D.L. & W. R.R., East of Harrison, NJ*, from August, October, and November 1905. On file in Amtrak's Engineering Archives, Philadelphia, PA.

⁶ Pennsylvania Railroad, *Bridge carrying Tracks of Penna. New Jersey & New York R.R. over New York Div. (P. R. R.) Tracks, East of Harrison, NJ*, December 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

⁷ McClintic-Marshall, *Bridge for Penna.*, 1907.

⁸ Frederic R. Harris, Inc., *Bridge Condition Inspection Report of Amtrak U.G. 7.96 Northeast Corridor over Conrail and PATH, City of Harrison, Hudson County, New Jersey*, Prepared by Frederic R. Harris, Inc., Consulting Engineers for Amtrak, August 25, 1997.

⁹ McDonald, "Amtrak Bridge No. 7.80," 4-5.

¹⁰ Pennsylvania Railroad, Office of Engineering, Bridges and Buildings *Bridge No. 7.80, East of Harrison, New Jersey: Reinforcement of Steel Beams*, Sheet IA. January 31, 1947. On file in Amtrak's Engineering Archives, Philadelphia, PA; Frederic R. Harris, Inc., *Bridge Condition Inspection Report of Amtrak U.G. 7.96 Northeast Corridor over Conrail and PATH, City of Harrison, Hudson County, New Jersey*, Prepared by Frederic R. Harris, Inc., Consulting Engineers for Amtrak, August 25, 1997, 6.

¹¹ Harris, *Bridge Condition Inspection Report*, 6.

B. Historical Context

(See information provided in Pennsylvania Railroad [PRR], Amtrak Bridge No. 7.80, HAER No. NJ-160.¹²)

Part II. Structural/ Design Information

A. General Statement

1. Character: Amtrak Bridge No. 7.96 is the western of two bridges known as the Sawtooth Bridges, which carry Amtrak's Northeast Corridor (the former PRR) through a busy transportation corridor where several railroads converge located in the Meadowlands immediately north of the Passaic River in Kearny, New Jersey. Amtrak Bridge 7.96 carries Northeast Corridor tracks over Conrail and PATH tracks and is used by both Amtrak and NJ TRANSIT. The bridge is a two-span, skewed, simply supported structure with a concrete ballasted deck superstructure consisting of concrete encased rolled steel floor beams supported by riveted steel deck and cap girders. The bridges' name "Sawtooth" is derived from their sawtooth-like appearance in plan, which is the result of the decking that supports the bridges as they cross over other rail lines. The staggered viaduct form of the bridges, allowing them to span separate features, is their most distinctive design characteristic. The concrete and steel materials used in the bridge construction are consistent with other railroad bridges of the period.

2. Condition of Fabric: The Sawtooth Bridges, originally constructed ca. 1907, underwent repairs in 1947 and a rehabilitation project in the early 1980s to strengthen selected columns, remove concrete encasement from columns, repair bearings, and install waterproofing and deck drains. Additional repairs to Bridge 7.96 occurred in 1997.¹³ Despite these rehabilitation efforts, recent inspections of both bridges indicated that the Sawtooth Bridges continue to deteriorate. Amtrak conducted a special inspection and condition survey in 2013 and concluded the Sawtooth Bridges are in poor to very poor condition. The inspection survey noted that deck waterproofing of both Sawtooth Bridges is no longer functioning as intended and seepage coupled with calcite formation have contributed to corrosion of the floor beam webs. Rated capacities of the floor beams indicated that the expected service life of these systems has been reached. While no clear substructure observations showed an inadequate capacity of foundations at either bridge, the piers and abutments are likely founded on timber piles, the condition of which was unknown.

¹² McDonald, 5-12.

¹³ Harris, 7-8.

B. Description

Amtrak Bridge 7.96 is a two-span, skewed, simply supported structure with a concrete ballasted deck superstructure consisting of concrete encased rolled steel floor beams supported by riveted steel deck and cap girders. The substructures include plain concrete abutments and three piers consisting of built-up, concrete-filled, steel columns. Amtrak Bridge No. 7.96 has two staggered viaduct structures each having an overall average length of 278'-0" with an overall two span width of 71'-0".

C. Mechanicals/Operation

The Sawtooth Bridges carry two Mainline NEC tracks operated by Amtrak. Track 2 is to the south and is normally dedicated to eastbound trains and Track 3 is to the north and is normally dedicated to westbound trains. They are located between Swift Interlocking to the east and Hudson Interlocking to the west. The existing tracks are currently operating under speed restrictions of 60 miles per hour due to poor infrastructure conditions.¹⁴ The tracks consist of continuous welded rail with concrete ties. Existing track centers are 14'+/-. The bridges are both ballast deck bridges. Bridge 7.96 goes over tracks belonging to PATH and Conrail's Center Street Branch.

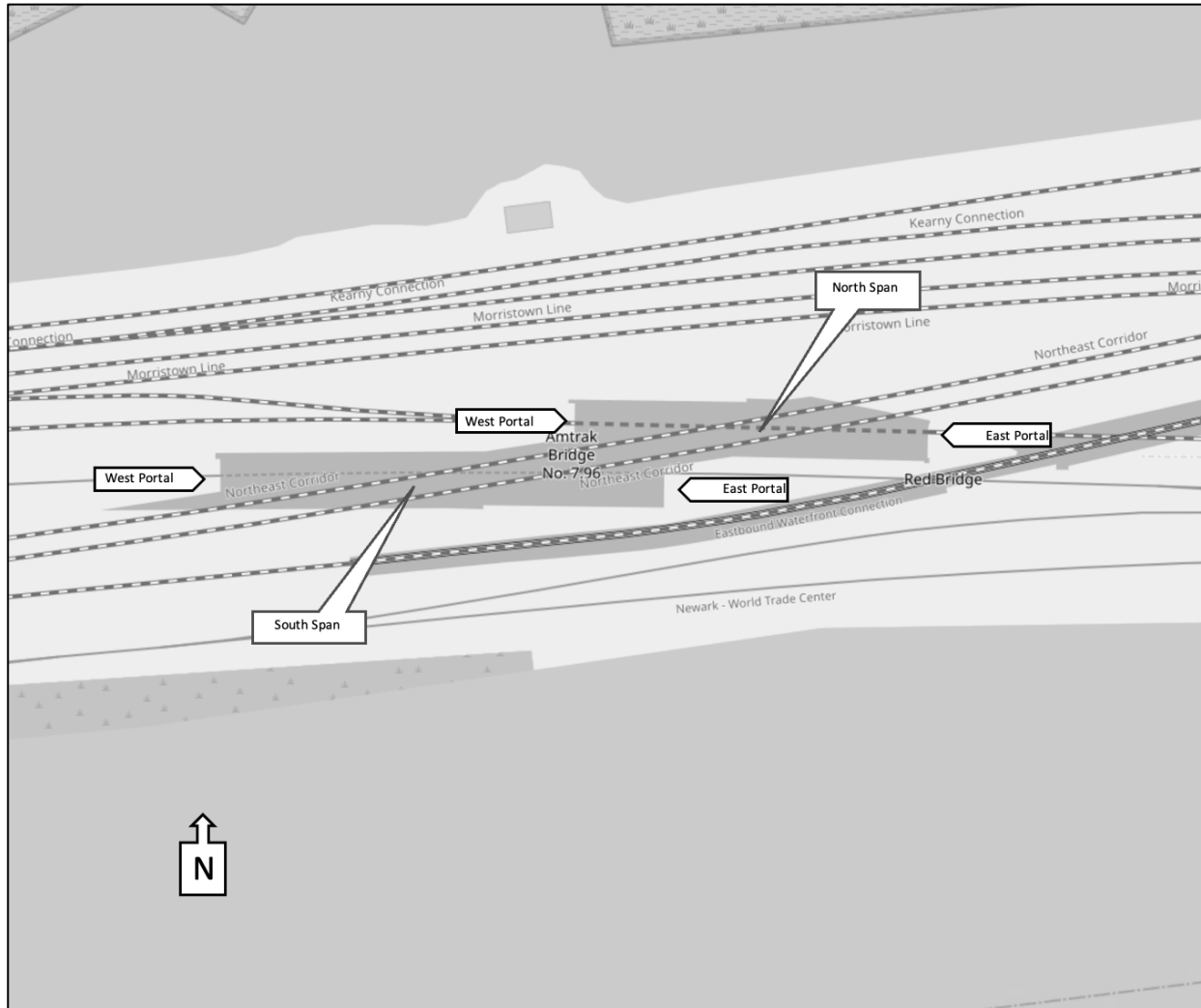
D. Site Information

(See Figures 1 through 3 and information provided in PRR, Amtrak Bridge No. 7.80, HAER No. NJ-160.¹⁵)

¹⁴ Portal Partners, *30% Basis of Design Report: Replacement of the Sawtooth Bridges*.
Report prepared by Portal Partners for Amtrak, November 10, 2023, 8.

¹⁵ McDonald, 14-15.

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Components of Amtrak Bridge No. 7.96

OpenStreetMap.org

Part III. Sources of Information

(For additional source information see Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160.¹⁶)

A. Primary Sources:

Federal Railroad Administration (FRA), *Northeast Corridor Improvement Project: Section Improvements FHB, Hunter to Hudson, Amtrak Work Package No. AB-102, Construction Project No. ZB4CFDA, Bridge N.J. 7.80 over Erie-Lackawanna R.R.*, Plans prepared by Frederic R. Harris, Inc. and Deleuw Cather/ Parsons for Amtrak and FRA. 1981. On file in Amtrak's Engineering Archives, Philadelphia, PA.

McClintic-Marshall Construction Co., *Bridge for Penna. New Jersey & New York R.R. over D.L. & W. R.R. Tracks, East of Harrison, NJ*, February 15, 1907. On file in Amtrak's Engineering Archives, Philadelphia, PA.

McClintic-Marshall Construction Co., *Bridge for Penna. New Jersey & New York R.R. over New York Div. (P.R.R. Tracks, East of Harrison, NJ*, February 12, 1907. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Historic American Engineering Record (HAER) of the National Park Service, Pennsylvania Railroad, Amtrak Bridge No. 7.80, HAER No. NJ-160, Prepared by AKRF, Inc., 2024.

Pennsylvania Railroad, Office of Chief Engineer, *PNJ & NY RR. 9446, Masonry Plan of Bridges to carry Penna New Jersey & New York RR, New York Div. (P.R.R.) Tracks and D.L. & W.R.R. Tracks, East of Harrison*, March 2, 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, Office of Engineering, *Bridges and Buildings Bridge No. 7.80, East of Harrison, New Jersey: Reinforcement of Steel Beams*, Sheet IA, January 31, 1947. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *Bridge 7.80, East of Harrison: Steel Inspection*, February 24, 1964. On file in Amtrak's Engineering Archives, Philadelphia, PA.

¹⁶ McDonald, 17-20.

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Pennsylvania Railroad, *Bridge carrying Tracks of Penna. New Jersey & New York R.R. over D. L. and W. R. R. Tracks, East of Harrison, NJ*, December 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *Bridge carrying Tracks of Penna. New Jersey & New York R.R. over New York Div. (P. R. R.) Tracks, East of Harrison, NJ*, December 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *P.N.J. & N.Y.R.R. Arrangement of Piles, West Abutment, Bridge over NY Div.*, October 24, 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *Plan of Bridges to Carry P.T. & T.R.R. over N.Y. Div P.R.R. and D.L. & W. R.R., East of Harrison NJ, As Built*, October 10, 1908. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *P.N.J. & N.Y.R.R. Revised Location Plan for Bridge over P.R.R. Morris & Essex Div. of D.L. & W. R.R., East of Harrison, NJ*, October 27, 1905. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *P.N.J. & N.Y.R.R. Revised Location Plan for Bridge over P.R.R. Morris & Essex Div. of D.L. & W. R.R., East of Harrison, NJ*, November 15, 1905. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *P.N.J. & N.Y.R.R. Location Plan for Bridge over P.R.R. Morris & Essex Div. of D.L. & W. R.R., East of Harrison, NJ*, August 31, 1905. On file in Amtrak's Engineering Archives, Philadelphia, PA.

Pennsylvania Railroad, *Test Wells at Bridges to Carry Penna. New Jersey & New York R.R. Tracks over D. L. and W. R. R. Tracks, East of Harrison, NJ*, April 21, 1906. On file in Amtrak's Engineering Archives, Philadelphia, PA.

B. Secondary Sources:

Frederic R. Harris, Inc., *Bridge Condition Inspection Report of Amtrak U.G. 7.96 Northeast Corridor over Conrail and PATH, City of Harrison, Hudson County, New Jersey*, Prepared by Frederic R. Harris, Inc., Consulting Engineers for Amtrak, August 25, 1997.

Molly McDonald, Historic American Engineering Record (HAER), National Park Service, U.S. Department of the Interior. "Pennsylvania Railroad, Amtrak Bridge No. 7.80." HAER No. NJ-160.

Portal Partners, *30% Basis of Design Report: Replacement of the Sawtooth Bridges*, Report prepared by Portal Partners for Amtrak, November 10, 2023.

“Progress of the P.R.R. Tunnel,” *The Jersey City News*, June 2, 1906: 1.

C. Likely Sources Not Yet Investigated

(None known)

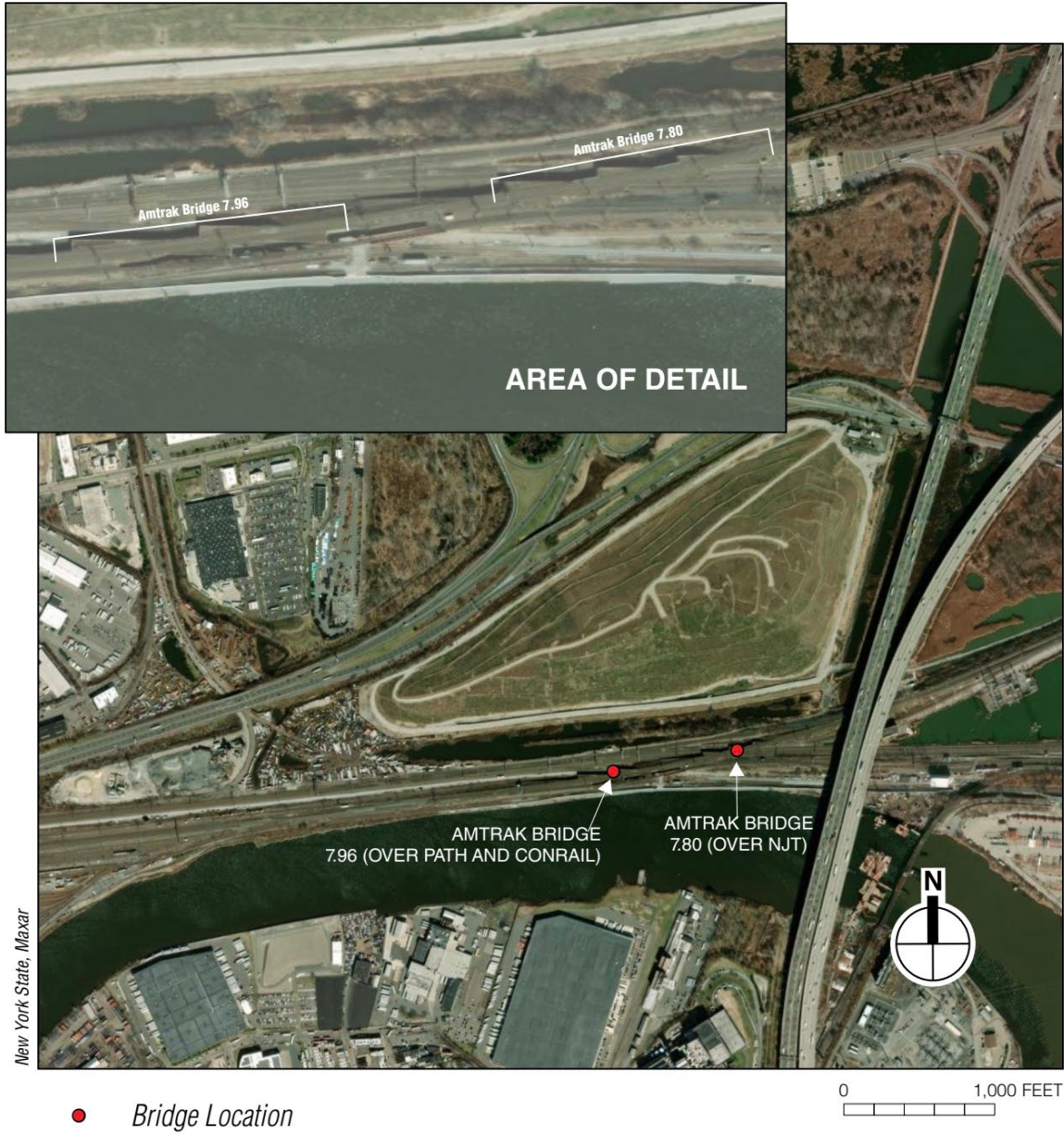
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USGSTopo: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information

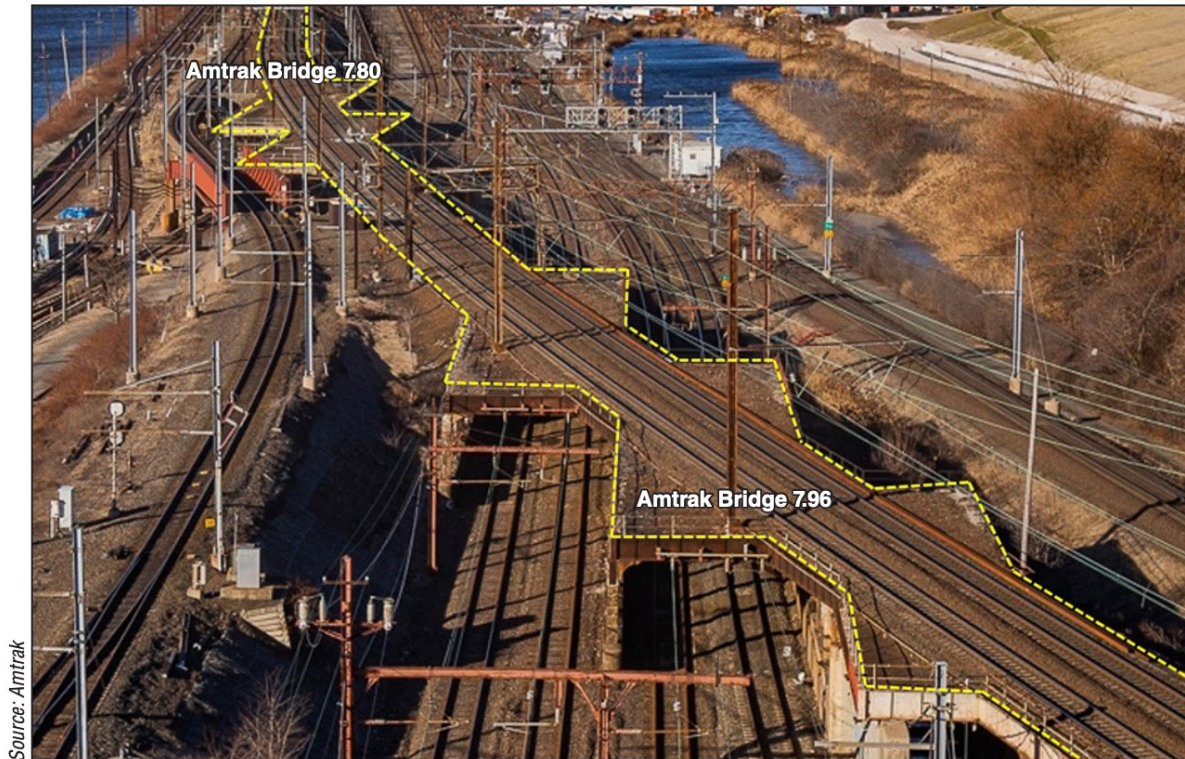
USGS Map
Figure 1

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Photograph
Figure 3

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Carrying two Northeast Corridor tracks over the Port Authority Trans-Hudson Corporation (PATH) Newark-World Trade Center (WTC) rail track and one Consolidated Rail Corporation (Conrail) freight rail track

Kearny

Hudson County

New Jersey

Photographer: Rob Tucher

March/April 2024

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| NJ-161-1 | View of the bridge in context with the New Jersey Turnpike in the background. View looking east. |
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| NJ-161-17 | Detail view of the northeast stone abutment. View looking south. |
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